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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

November 8, 1996

Reply To
Attn Of: HW-113

Nolan R. Jensen, Acting Manager
Environmental Restoration Program
Department of Energy
Idaho Operations Office
850 Energy Drive
Idaho Falls, Idaho 83401-1563

Subject: Three-Year Review, Idaho National Engineering Laboratory Test Reactor Area Perched Water System Operable Unit 2-12.

Dear Mr. Jensen:

The EPA has completed the three-year review pursuant to the provisions of the Record of Decision (ROD) for the Test Reactor Area (TRA) Perched Water System Operable Unit designated OU 2-12. EPA has concluded that the remedies selected for this site remain protective of human health and the environment, and agrees with the recommendations for the OU 2-12 monitoring included in the Third Annual Technical Memorandum for the Post-ROD Monitoring for the TRA OU 2-12. A copy of the review is enclosed. If you have any questions, please contact me at 206-553-8633.

Sincerely,

R W Poeton

Richard Poeton, WAG 2 Manager

Encl

cc: Dean Nygard, IDHW, 1410 N. Hilton, Boise, ID, 83706 w/encl
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W. Pierre, ECL-113

U.S. Environmental Protection Agency
Region 10
Office of Environmental Cleanup
Three-Year Review
Idaho National Engineering Laboratory
Test Reactor Area Perched Water System
Operable Unit 2-12

1. Introduction

EPA Region 10 conducted this review pursuant to the provisions of the Record of Decision (ROD) for the Test Reactor Area (TRA) Perched Water System Operable Unit designated, OU 2-12, dated December 15, 1992. This site is located at the Idaho National Engineering Laboratory. In addition to the ROD, this review is performed pursuant to, CERCLA Section 121(c), NCP Section 300.400(f)(4)(ii), and OSWER Directives 9355.7-02 (May 23, 1991) and 9355.7-02A (July 26, 1994). This is a statutory review. The purpose of this review is to ensure that the remedial action remains protective of public health and the environment and is functioning as designed. This document will become a part of the site file. This review (Type Ia) is applicable to a site at which response is ongoing.

Appendix A is a list of documents that formed the basis for this review. Appendix B includes a summary of site characteristics from the OU 2-12 ROD.

II. Remedial Objectives

The ROD determined that no remedial action was necessary for the Perched Water System at the TRA to ensure protection of human health and the environment. This decision was based on the results of the human health and ecological risk assessments, which determined that conditions at the site posed no unacceptable risks to human health or the environment for expected current or future use of the Snake River Plain Aquifer beneath the Perched Water System at the Test Reactor Area.

The assumptions upon which this decision was based were:

- Periodic groundwater monitoring would be conducted to verify that contaminant levels decline as predicted by a numerical model. A monitoring program would be developed as a post-ROD document.

- Operations at TRA will continue at least through the year 2016, followed by a minimum estimated 10-year decontamination and decommissioning period. Existing institutional controls, which include land use and property access restrictions, will be maintained during this period.

- The replacement of the existing Warm Waste Pond in 1993 with a lined pond. This pond was viewed as the major source of contamination in the perched water.

Because the "No Action Decision" of the OU 2-12 ROD resulted in hazardous substances remaining at the site above health-based levels, a five-year statutory review is required. The ROD required that this review take place three years after ROD signature and be conducted by DOE, EPA, and IDHW. The purpose of the review is to assure that human health and the environment are being protected and that the assumptions on which the decision was based remain valid.

III. Post-ROD Activities

The Post-ROD Monitoring Plan for OU 2-12 (June 1993) which was developed and approved in accordance with the ROD provisions, requires periodic groundwater monitoring for the contaminants of concern identified in the Remedial Investigation Report. The monitoring plan also provided for DOE to submit an annual sampling and analysis report of monitoring activities which included an evaluation of the sampling data.

Monitoring wells have been installed in the deep perched water system (approximately 140 ft below land surface) and Snake River Plain Aquifer(SRPA) which is located approximately 450 ft below land surface, to detect contamination in the aquifer below TRA. The Warm Waste Pond was removed from service and replaced with a lined pond in 1993. With the replacement of the Warm Waste Pond, modeling results predicted that the SRPA would be restored to usable condition with a reasonable time frame. This is based on a decline in contaminant concentrations over time. These changes are summarized in the OU 2-12 Monitoring Plan.

IV. Sampling Results Summary

Six monitoring wells were selected to monitor the deep perched water system (i.e., wells designated PW-11; USGS-53; USGS-55; PW-12; USGS-54; and USGS-56 as shown in the Third Annual Technical Memorandum August 1996, Figure 2-1). Four monitoring wells were selected for monitoring the SRPA (i.e., wells designated TRA-7; USGS-58; USGS-65; and TRA-8 as shown in above referenced Technical Memorandum). Contaminants of Concern include: Cesium-137; Cobalt-60; Strontium-90; Tritium; Arsenic; Cadmium; Chromium; Lead; etc.

After three years of study, chromium and tritium concentrations in SRPA monitoring wells remain above drinking water standards in two monitoring wells (i.e., TRA-7 and USGS-65) and are not declining as expected. However, insufficient data has been collected to date, to statistically determine the

significance of these results. Overall, other contaminants have behaved as predicted in the SRPA. The deep perched water system wells show that removing the Warm Waste Pond from service has resulted in reduced concentrations with time. In general, all monitoring wells show a decreasing contaminant concentration trends. Two exceptions are monitoring wells USGS-53 for Chromium and USGS-58 for Tritium. These contaminant levels both show a statistical increase with time. However, these results may be due to variations in precision between earlier and recent data sets.

V. Recommendations

EPA agrees with the following recommendations for the OU 2-12 monitoring which were included in the Third Annual Technical Memorandum:

- Sampling should continue at aquifer well TRA-8.
- Sampling should begin at aquifer well TRA-6.
- Positive displacement pumps in wells TRA-6 and TRA-8 should be replaced with submersible pumps to improve sampling efficiency.
- Sampling frequency should be reduced to semi-annually for both the Deep Perched Water System and the Snake River Plain Aquifer wells.
- Aquifer wells should be sampled for total dissolved chromium and tritium semi-annually, and annually for cadmium, cobalt-60 and strontium-90.
- Deep perched water system wells should be sampled for total dissolved chromium, tritium, cadmium, cobalt-60 and strontium-90 semi-annually.

As contaminants remain on site above health-based levels, the five year review process should continue. It is expected that this monitoring program and statutory five-year reviews will become a part of the larger comprehensive ROD, five-year review process, currently scheduled for October 1997.

VI. Statement of Protectiveness

I certify that the remedies selected for this site remain protective of human health and the environment.

VII. Next Review.

Monitoring will continue as modified above. It is expected that the planned Comprehensive ROD (OU 2-13) will incorporate the five-year review requirements for OU 2-12. At that time, subsequent monitoring will be designed to support the OU 2-13 ROD, and future reviews will be performed consistent with the OU 2-13 ROD. In the event that the planned OU 2-13 ROD schedule is not met, the next review for OU 2-12 will be performed no later than five years from the date of this review.

10/30/96
Date

Randall F. Smith, Director
Office of Environmental Cleanup

Appendix A
Documents and Basis for Review

1. Arnett, R.C., T.R. Meachum, and P.J. Jessmore, August 1995, Post Record of Decision Monitoring for the Test Reactor Perched Water System, Operable Unit 2-12, Second Annual Technical Memorandum, INEL-95/0408, prepared by Lockheed Martin Idaho Technologies for the U.S. Department of Energy.

2. Arnett, R.C., T.R. Meachum, and P.J. Jessmore, August 1996, Post Record of Decision Monitoring for the Test Reactor Perched Water System, Operable Unit OU 2-12, Third Annual Technical Memorandum, INEL-96/0305, prepared by Lockheed Martin Idaho Technologies for the U.S. Department of Energy.

3. Dames and Moore, 1993, Post Record of Decision Monitoring Plan for the Test Reactor Area Perched Water System Operable Unit 2-12, EGG-ER-10547, Rev. 1, prepared by EG&G Idaho, Inc., and the U.S. Department of Energy by Dames and Moore.

4. Jessmore, P.J. June 1994, Technical Memorandum, Post Record of Decision Monitoring for the Test Reactor Perched Water System, Operable Unit 2-12, prepared by EG&G Idaho, Inc., for the U.S. Department of Energy.

5. Lewis, S.M., P.O. Sinton, M.J. Conrad, J.W. Gordon, June 1992, Remedial Investigation Report for the Test Reactor Area Perched Water System (Operable Unit 2-12), EGG-WM-10002 Rev.0, prepared by EG&G Idaho, Inc., and the U.S. Department of Energy by Dames and Moore.

6. Record of Decision, December 1992, Test Reactor Area Perched Water System, Operable Unit 2-12, Idaho National Engineering Laboratory, Idaho Falls, Idaho, issued jointly by the U.S. Department of Energy, U.S. Environmental Protection Agency, and the Idaho State Department of Health and Welfare.

Appendix B
OU 2-12 ROD Summary of Site Characteristics

5. SUMMARY OF SITE CHARACTERISTICS

5.1 Geology and Hydrology

The INEL is located along the northern edge of the Eastern Snake River Plain, a 50- to 70-mile wide northeastern trending geologic basin extending from the vicinity of Twin Falls on the southwest to the Yellowstone Plateau on the northeast. The Eastern Snake River Plain is underlain by a substantial volume of volcanic rocks with relatively minor amounts of sediment, except along its margins where drainages emerge from the nearby mountain ranges. The Test Reactor Area is underlain by 30 to 50 feet of surficial alluvium and a thick sequence of fractured basalt flows with thin sedimentary interbeds. These alluvial sediments are primarily composed of sandy gravel with minor amounts of silt and clay. Quartz is the major mineral component of the alluvium, followed by plagioclase and alkali feldspar and minor amounts of clays.

Fractured basalt flows underlie the surficial alluvium and are separated by sedimentary interbeds that vary in thickness and lateral extent. The most extensive interbed occurs approximately 150 feet below the surface. Similar to the surficial alluvium, quartz is the major mineral component of the sedimentary interbeds, followed by plagioclase and alkali feldspars. The Snake River Plain Aquifer occurs in this sequence of basalt with sedimentary interbeds at a depth of approximately 480 feet beneath the Test Reactor Area (see Figure 3).

5.1.1 Surface Water

Most of the INEL is located in a topographically closed drainage basin, referred to as the Pioneer Basin, where the Big Lost River, Little Lost River, and Birch Creek once drained from the mountain ranges to the west and north. Today, most of the water flowing in these streams is diverted upstream of the INEL for irrigation purposes.

The Big Lost River is the principal natural surface-water feature on the INEL and is the closest major drainage to the Test Reactor Area. The Big Lost River has not flowed on the INEL since 1984. Neither the Test Reactor Area facilities nor ponds are located within the 100- or 500-year flood plain of the Big Lost River.

5.1.2 Perched Water

The presence of perched water at the Test Reactor Area is directly related to infiltration from wastewater disposal ponds. Perched groundwater occurs when downward flow of the

wastewater to the aquifer is impeded by fine-grained sediments and/or dense basalt flows having relatively low permeability. Two distinct perched water zones, shallow and deep, have been recognized at the Test Reactor Area (see Figure 3). The shallow perched groundwater occurs in the immediate vicinity of the ponds and retention basin, and forms on the interface between the surficial alluvium and the underlying basalts at about 50 feet below land surface.

The deep perched groundwater is caused by low-permeability sediments and/or sediment infilling of fractures within the interbedded basalt-sediment sequence. The top of this interbedded basalt-sediment sequence begins at depths of approximately 140 feet below land surface and ends at depths of about 200 feet below land surface. This perching zone includes silt, clay, sand, cinders, and gravel, and appears to be laterally continuous in the vicinity of the Test Reactor Area.

Water levels in the deep perched monitoring wells and the areal extent of the deep perched groundwater have fluctuated in response to the volume of water discharged to the surface ponds. During March 1991, the areal extent of the deep perched groundwater was about 6,000 by 3,000 feet (see Figure 4). The volume of deep perched groundwater was calculated to be approximately 1.4 billion gallons at these dimensions.

5.1.3 Snake River Plain Aquifer

The eastern portion of the Snake River Plain Aquifer extends from Ashton, Idaho, on the northeast to Hagerman, Idaho, on the southwest. The aquifer occurs within a series of basalt flows with interbedded sedimentary deposits. Recharge to the aquifer is primarily due to valley underflow from the mountains to the north and northeast of the plain, and from infiltration of irrigation water. Recharge to the aquifer within the INEL boundaries is primarily due to underflow from the northeastern portion of the plain and from the Big Lost River.

Site-wide water-level data show that the general direction of groundwater flow across the INEL is toward the south-southwest at an average gradient of about 4 ft/mi. The depth to the water table varies from about 200 feet below the surface in the northern portion of the INEL to about 900 feet below the surface in the southern portion. At the Test Reactor Area, the depth to groundwater is at approximately 480 feet and the gradient is about 2 ft/mi.

Aquifer permeability is controlled primarily by fractures, fissures, and voids along the upper and lower contacts of basalt flows, large interstitial voids, and intergranular pore spaces. Based on site-specific data, the average groundwater flow velocity at the Test Reactor Area was estimated to be 4.3 feet per day.

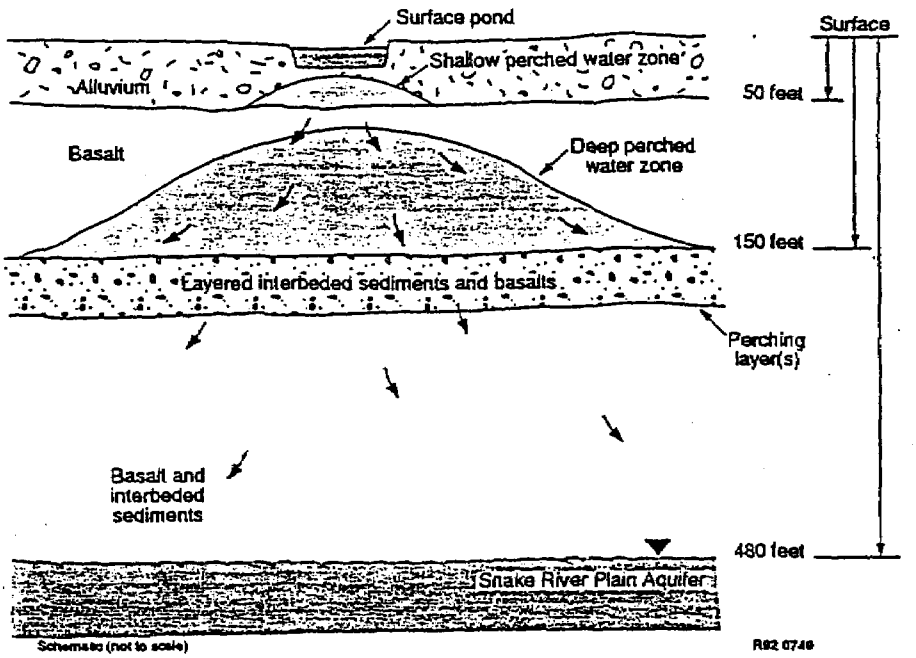

Figure 3. Generalized cross section showing a TRA wastewater disposal pond and the perched water system (PWS) under the TRA.

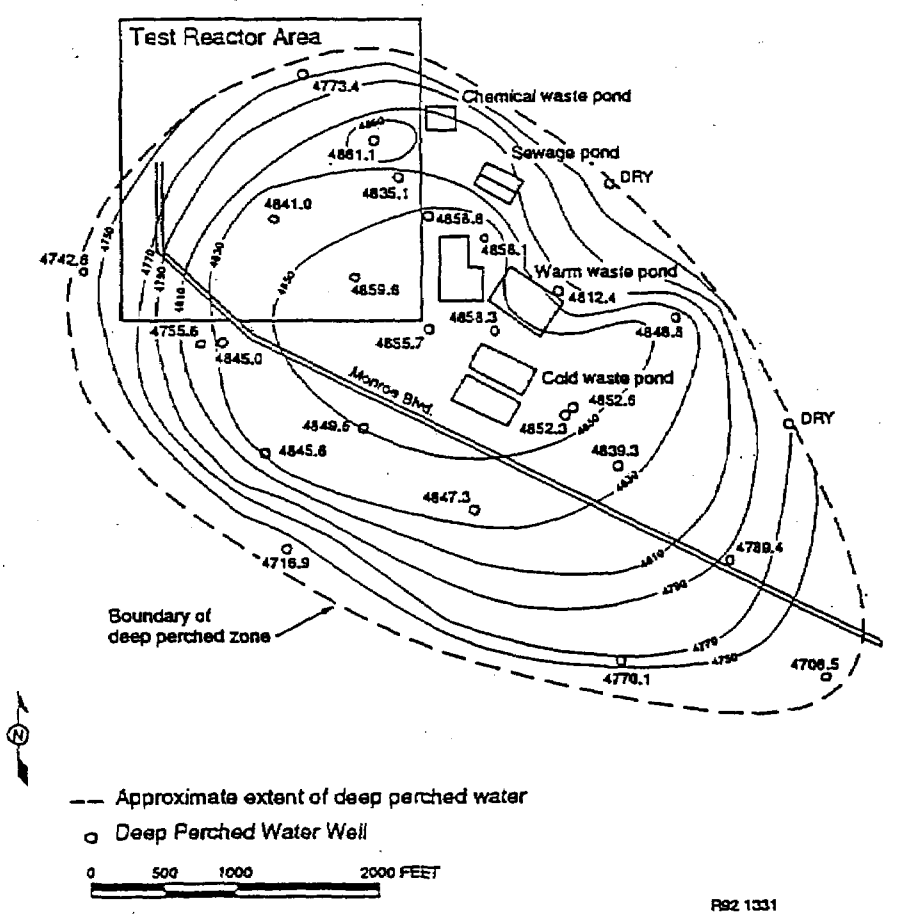

Figure 4. Configuration of the deep perched ground water at TRA, March 21, 1991.